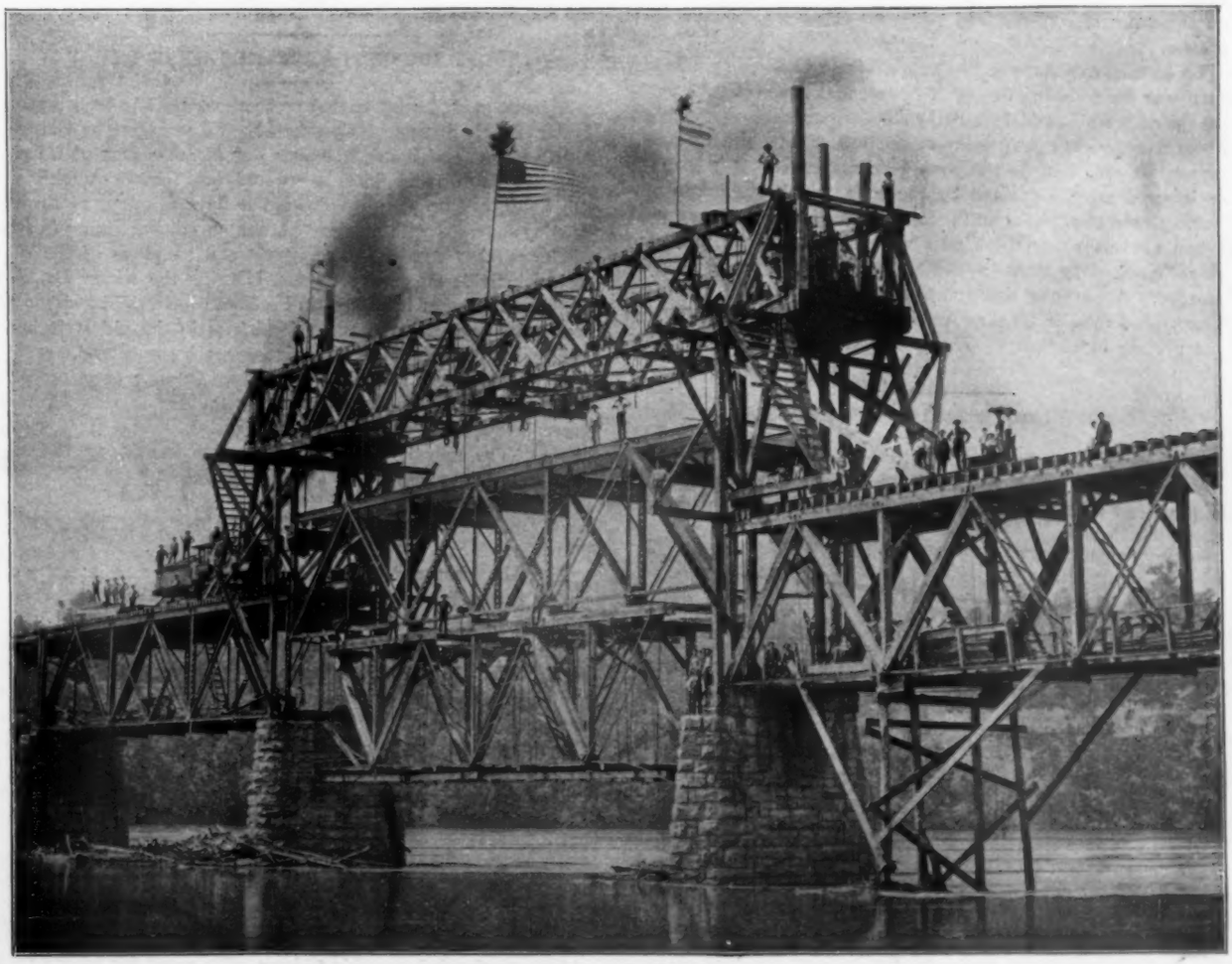
"WRITTEN SO YOU CAN UNDERSTAND IT."

POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

Vol. 1, No. 15. CHICAGO, APRIL 19, 1902. PRICE 5 CENTS.

Building a Bridge While Cars Run



Removing Old Span and Replacing with New (Courtesy Railway Review.)

IN THIS ISSUE:

Used Cat's Eyes for a Clock.
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A Wall Papering Machine.
Origin of the Tin Soldier.
Locomotives of a Century.
The Harem as It Is Today.
Sixty-Six Articles—27 Illustrations.

FOR SALE BY ALL NEWSDEALERS.

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APR 18 1902
SMITHSONIAN DEPOSIT.

REBUILDING A RAILROAD BRIDGE.

Without Interference With the Regular Operation of Trains.

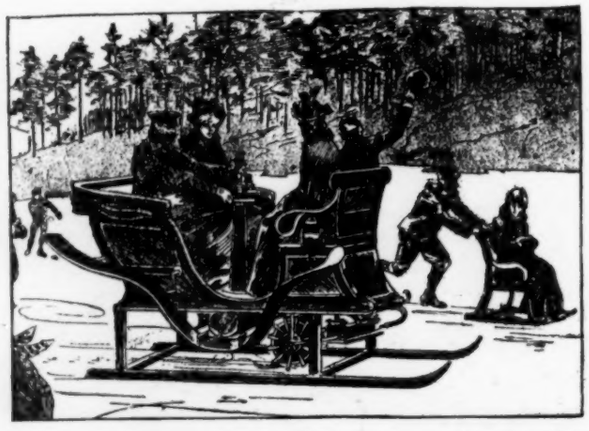
When the county board decide to build a new bridge over Lost Creek the public travel either fords the stream, goes around a few miles or gives up travel for the summer. When a railroad finds it necessary to put a new bridge in place of an old one the exigencies of operation require that the regular schedule of at least all principal trains must not be disturbed. A hot box on a passenger car often causes more delay than the taking away of a railroad bridge weighing hundreds of tons and replacing it with a new one even heavier.

The bridge renewing illustrated on our front page shows how this is done. The old structure was a wooden truss bridge, the lower part of which was used by teams, while the track rested on the top. It was replaced one span at a time, by new steel trusses.

To do this, explains the Railway Review of March 15, the new span was built on top of the old span, and when all was ready the spans were lowered until the new part rested on the piers. From a temporary span seen at the top of the picture strong iron screw rods each 30 feet long were suspended. The spans to be lowered were supported by the rods, which had large nuts bearing upon iron plates on the top chords of the temporary span. When all was ready these nuts were slacked off by means of gears operated by steam power and the old and new spans descended. About one hour only was required in the lowering. Thirty-four men in 80 days completed the work of taking out and putting in 12 spans. The bridge is on the L. & N. R. R. where it crosses the Tennessee river at Florence, Ala.

AUTOMOBILE SLEIGHS IN PRUSSIA.

In Prussia, where the snows have been particularly heavy this winter, the automobile sleigh has come into prominence as the latest fad. It is similar in construction to the passenger



car in use for passenger transportation, save that the wheels have been done away with and the vehicle placed on runners, while the motor is connected with what looks like a paddle wheel of a steamboat in miniature.

CORUNDUM AND CARBORUNDUM.

One of our subscribers in Montana writes to report the discovery of something which he can use in place of emery. It appears to have some of the qualities of carborundum described in our issue of Feb. 22; he wants to know if it can be the same.

No, carborundum, as stated, is an artificial product not found in nature, and is produced only by manufacture. What our reader has found is evidently corundum, which is a mineral and belongs to the same family as emery. Corundum and carborundum, however, are radically different in composition.

USED CAT'S EYES FOR A CLOCK.

The Chinese used to be able to tell the time of day by looking at the eyes of cats. Pere Hue while traveling in the interior of China asked a peasant boy if it were yet noon. The child glanced first at the sky, where the sun was hidden by the clouds. He ran back into the house and reappeared in a moment with a large cat in his arms. Pushing open its eyelids with his forefinger—an operation to which the animal submitted with a patience evidently born of long habitude—he said carelessly: "Look; it wants still an hour to noon." When the missionary expressed his amazement at this primitive timepiece, other natives explained to him that on cloudy days their cats always served them as dials. They pointed out that the pupils of the creature's eyes grew gradually narrower until noon, when they were little more than thin perpendicular lines, and that with the descent of the sun began their slow expansion.

HENHOUSE THAT MAKES HENS LAY.

A home-made henhouse that makes hens lay has been invented by Dr. E. M. Santee, of Cortland, N. Y., according to claims of his friends. The house is built of single thickness of matched pine boards and the floor is covered one foot deep with coal ashes. It has no glass windows, but light is admitted through openings covered with muslin. Muslin curtains are hung in front of the perches at night for warmth, and hangings of the same material divide the compartments. During the winter Dr. Santee has found that hens kept in his house have averaged 100 per cent more eggs than the same kind kept in the old style house built with double walls with air spaces between and provided with double floors and glass windows. On one occasion when a test was made, the thermometer in the open air was five degrees below zero, while inside the muslin henhouse it was 40 above. The new house is 8½ feet wide by 30 feet long and cost only $15 to build.

TECHNICAL SCHOOL FOR SOUTHERN WHITE BOYS.

The Manufacturer's Record has undertaken a splendid work, and is earnestly and successfully carrying into execution the establishment of technical schools in the South, for white boys. The industrial work for the negro has been a great success, but so far the white boy has been much neglected. The rapidly growing importance of the South as an industrial factor in the nation should secure to this movement the assistance it deserves. One of the suggested plans is for each southern manufacturer to pledge $125 yearly for four years to get these schools in operation. They would reap many fold in the educated brains of ambitious southern young men these schools would certainly produce.

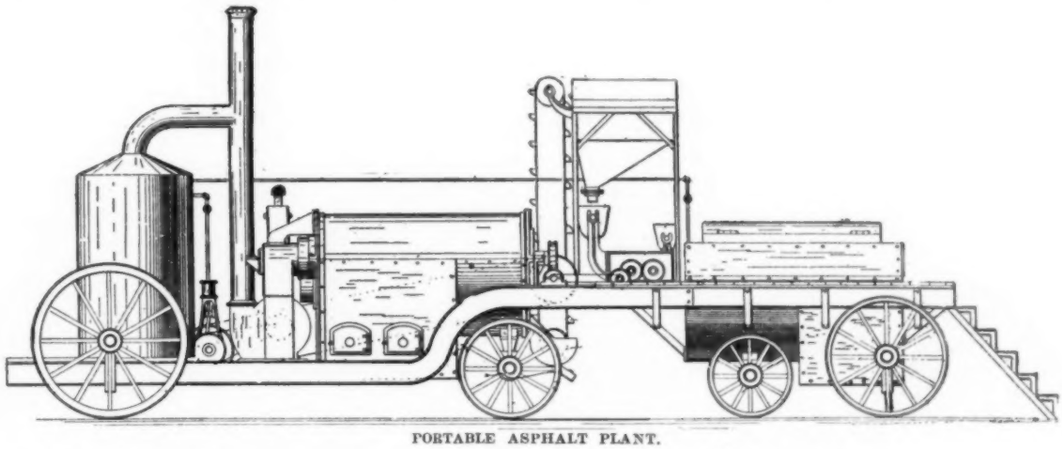
HOW TO MAKE GOOD CIDER.

A man who has had experience in the making and keeping of cider says that it is possible to keep cider sweet for twenty years, and not boil it, either. Boiling it spoils the flavor of the cider The trouble with most people who make cider is that after it is made it is let stand out in the heat until it commences to ferment. As soon as the cider is pressed out of the apples it ought to be strained and put into sulphured casks and set away in a cool place where the temperature is not above 50 degrees. There it will ferment slowl, and as soon as there is any sign of fermentation strain the cider. When it gets enough twang to it to be pleasant, put some wintergreen in the casks and keep the cider in a cool, dark place.

The first effort to utilize the wireless telegraph system on land is to be made by A. D. Matthews & Sons, a dry goods house of Brooklyn, N. Y. The firm expects to receive orders daily by wireless telegraph from points hundreds of miles about.

PORTABLE ASPHALT PLANT.

The preparation of asphalt for street paving use involves quite a process, in which a complete plant for the work is required. The railroads have for some time had such a plant on cars built specially for the purpose. This train is sent to any point on the road where work is to be done. Where repair work only is needed a smaller outfit would answer. An Indianapolis firm is now building such a machine, which can be loaded on one flat car, or hauled about the streets to any point desired. We illustrate the machine, which includes boiler, engine, mixer, cooker, elevator and rollers.



PORTABLE ASPHALT PLANT.

HOW TO STERILIZE A NEEDLE.

A doctor says if the needle is passed through an alcohol flame or boiling water, and used without touching the point with the fingers it is safe. The average mother thinks if in removing a splinter or other foreign substance she uses a needle instead of a pin she has conceded all that is required of her, but the surgeon, keen to the dangers of germ contamination, knows that a step further is necessary. The same authority also mentions the value in the mother's medicine chest of a little gutta-percha tissue such as every one who has had a tooth filled will recognize. This will be found to be of great service in covering any moist dressing of wounds, as it protects the clothing from the wet and also retains the moisture which it is needed to preserve in the dressing.

ARMORY FACTORY IN TWENTIETH CENTURY.

Among the many industries connected with the iron and steel trades there is one survival from former times in England which is of great interest. This is the mail chain armor manufacture in Walsall. J. W. Hawkins & Co., Limited, who contract with the government for the supply of spurs, bits, stirrups, harness, buckles, chains, etc., also supply mail chain jackets and other steel productions for use in India, Central and South America and other countries. These jackets of mail, which weigh from 15 to 18 pounds, are worn by army officers, and sometimes by Indian native princes, and are made of steel rings of 3/8 inch diameter. It takes about 3,000 rings to make a square foot of armor. These rings are formed out of soft steel wire, which is revolved around mandrels 4 inches long and of the same diameter as the rings required, each mandrel taking about 6 feet of wire, and subsequently divided by a hand saw. Hardening is accomplished by putting them upon trays and plunging them when red hot into oil, after which they are polished in revolving drums.

The son of Spain's Queen Regent will be crowned Alfonso XIII. King of Spain, on May 12.

WEIGHT OF A BODY IN WATER.

A mass of metal weighs 100 pounds at the surface of the sea, says a querist to Mines and Minerals. If it is immersed 10 feet it weighs less; if 20 feet still less, and the deeper it goes the less it weighs. Now, I wish to know how much it weighs for each 10, 20 or 100 feet, and I cannot find any work that will give me the formula.

The statement that a body weighing 100 pounds at the bottom of the sea will weigh less at a depth of 20 feet, or more than when submerged to a depth of 10 feet below the surface, is not correct as a general statement, says J. T. Beard in reply. The buoyant pressure by which the weight of a submerged body is decreased is exactly equal to the weight of the displaced liquid, whether it be distilled water, sea water, oil or other liquid. In the case in question the weight of the displaced sea water varies between 1,025 and 1,028, principally according to its salinity. In areas of concentration, due to evaporation, formation of ice, etc., sea water is densest at the surface and increases as the depth below the surface increases until a depth of 800 or 1,000 fathoms is reached, beyond which point the density of the water slowly increases. In areas of dilution, caused by heavy rainfalls, melting of ice, inflow of streams, etc., the density of sea water increases slowly from the surface to a depth of 50 to 100 fathoms. The density then decreases as the depth increases until the depth of 800 or 1,000 fathoms is reached. Beyond this depth, as before, the density of the water increases slowly with the depth. Thus no law or formula will express the ratio of increase or decrease in the weight of a body submerged in sea water.

SECRET OF MAKING THE FAMOUS INDIAN WAX-CLOTH DISCOVERED.

For generations the commercial world has endeavored to discover the method employed by the natives of India in manufacturing the famous Afridi-wax cloth and the wax or rogham which it is made. At last the secret has been discovered by Dr. George Watt of Calcutta. The wax is made from the oil of wild safflower (Carthamus oxyacantha) seed. The seeds are husked and pressed in an ordinary mill. They yield about 25 per cent of a clear, yellow, thin oil, which is called "polli." This is placed in earthen vessels and boiled continuously for twelve hours. Then the whole is thrown into large shallow trays containing cold water. By this treatment it is converted into a thick jelly-like substance, which is rogham. It is then stored in kerosene-oil cans until required for the manufacture of the Afridi-wax cloth. Before being applied to the cloth it is mixed with some mineral color and drawn out into fine threads by means of a pointed style, with which the pattern is traced.

There is an ever increasing demand for the cloth for household drapings.

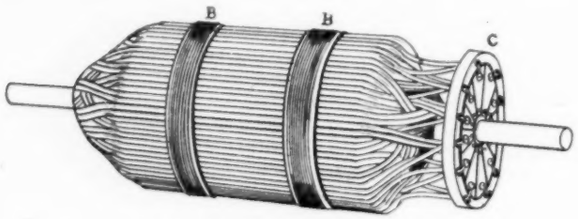
Easy Electrical Experiments
FOR BOYS

By L. P. Dickinson

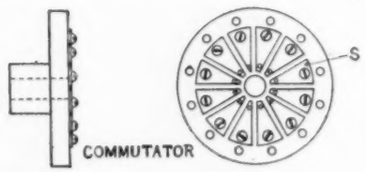
CHAPTER XV.

THE ARMATURE AND COMMUTATOR.

If the directions given in the last paper for winding the armature have been followed, the entire surface of the latter will have been covered with four layers of wire, distributed in twelve coils, each coil terminating in two wires whose tagged ends project from one end of the armature. The first thing to do after seeing that the winding is smoothly in place is to apply what are called "binding wires." These are shown at B in the figure, and are for the purpose of holding the wires firmly in place when the armature rotates rapidly. The wires tend to fly outward, and they must be held tightly to the core by wires wound around the finished armature. Wind a strip of heavy wrapping paper ½ inch wide completely around the armature



ARMATURE AND COMMUTATOR



SIDE VIEW END VIEW

near one end, and upon this strip wind six complete turns of No. 20 brass wire. This wire should be drawn very tight, and should be evenly wound. Solder it smoothly at two or three different points around the armature, and cut off the ends very close and smoothly, so that there will be no sharp points projecting. All superfluous solder should be smoothed off with a file, so that the armature may rotate very close to an iron pole piece without striking the latter. Wind a similar coil of brass wire at the other end of the armature protecting the wires by a heavy strip of paper as before.

Now we come to the making of an important part of our motor, called the commutator. Turn out a piece of hard wood of the shape shown in the side view of the commutator. The hub, or smaller part, is ⅝ inch in diameter and ⅜ inch long. The flange, or larger part, is 2 inches in diameter and ¼ inch thick. Through the center is a hole just large enough so that the wooden spool will slip tightly upon the shaft. It must fit so tightly that it turns upon the shaft with difficulty.

Now cut out of a piece of sheet copper a circle 1¼ inches in diameter. Bore a hole through its center ¼ inch in diameter. Then divide the circular copper disc into twelve equal parts by lines running through the center. This can easily be done by drawing two lines through the center at right angles, which will divide the circular disc into four equal parts. Then divide each of the four sections into three parts, and this will make twelve sections into which the circle is divided. With a sharp-pointed knife cut this disc into twelve parts by drawing the point continually back and forth over these lines, using considerable pressure. It may dull the point of the knife somewhat, but if an old knife be used it will do no harm. There will then be twelve copper sectors of the shape shown at S.

Now draw on the outer face of the wooden spool just made a circle 1½ inches in diameter. Divide it into twelve equal parts by lines running through the center. Place each of the copper sectors just made so that its broad end just coincides with this circle, and so that it lies exactly in the center of one of the sections just marked upon the wooden disc. Fasten it there by a ⅜ inch round-headed brass screw at its large end, and by a very small brad, driven through the copper strip as close as is possible, to the inner end of the latter. Fasten the remainder of the twelve strips in a similar manner to the wooden disc. As the copper sectors were cut from a 1¼ inch circle, and the circle upon the disc is 1½ inches in diameter, there will be a space between each copper sector and its neighbor about 1-16 inch wide. Be very sure that there is no metallic connection between any two of the strips. They must not touch each other nor the shaft, nor must the brad which holds one strip touch the brad which holds the next strip, nor should it touch the shaft.

Number these sectors from 1 to 12. Slip the commutator upon the shaft, so that sector No. 1 is opposite to coil No. 1, with the copper sectors facing outward. Then connect the end of coil No. 1 (E-1) and the beginning of coil No. 2 (B-2) to sector No. 1. Connect the end of coil No. 2 (E-2) and the beginning of coil No. 3 (B-3) to sector No. 2. Proceed in this manner, connecting the end of each coil and the beginning of the next coil to a sector in the commutator. When you have gone clear around the armature, connect the end of coil No. 12 and the beginning of coil No. 1 to sector No. 12 of the commutator. These connections should be made by twisting the two wires together and passing one of them through a hole in the wooden spool just above each sector, and clamping it firmly under the brass screw. Draw all wires as tight as possible, and be sure that the commutator is tight against the armature coils.

(To be continued.)

OLIVE OIL GROWS BAD WITH AGE.

Olive oil begins to deteriorate from the moment of manufacture, and much of that served in restaurants and sold in stores of the United States is absolutely unfit for use. Robert P. Skinner, United States consul general at Marseilles, France, reports:

The consuming public in the United States would doubtless secure more satisfying results, if the thousands of small retail dealers there could be made to understand that the stock must be kept in a cool, dark place at all times, and in an even temperature. The rule more frequently than not is to see the handsome olive oil bottles standing like sentinels on prominently exposed shelves, in well-heated rooms, with the full sunshine playing upon them a considerable portion of the day.

There is a very great difference in the quality of the crops of different years, which, when good, permit the resultant oil to be kept sweet sometimes for a number of years. On the other hand, when the crop is bad, rancidity and congelation can scarcely be prevented after the oil is twelve months old. The crop was so bad last year that a number of crushers in Spain, who in part supply the large packers of this region, refused to make any deliveries whatever, preferring to abandon the business for a period rather than to allow their marks to be damaged in reputation. The olive crop this year is considered as good in quality as last year's was bad.

The Merchants' National Bank of Chicago on the day preceding its union with the Corn Exchange National Bank presented its employes with $100,000. The highest amount given to any one man was $12,000 and the lowest $50, which was to a messenger boy employed but a short time before.

COURTS OF GARDENS AND FOUNTAINS.

The interior court of the monster Liberal Arts building at the Louisiana Purchase exposition will form a restful retreat for the sight seers who have grown weary in their meanderings about the exposition grounds. The arcade development will form a cool, shady walk entirely around the court. It will be diversified with architectural fountains, statuary and vases, reproduced from the old Italian and Roman masters. Vines and flowers will be employed in a garden walk at the attic story line. The lower court will be carried out in the form of gardens and fountains.

LIBERAL ARTS BUILDING FOR ST. LOUIS FAIR.

The Liberal Arts building will cost $500,000. Although following the prevailing style of architecture—the Renaissance—it adheres very closely to classic lines. The main facade will be 750 feet long and will have three entrances. On the 525-foot facades are two entrances, one in each of the end pavilions. The building is to be constructed without interior columns, the exhibit space being spanned in one truss.

EARLY LIGHTING IN LONDON.

"In the year 1668, for the safety and peace of the city of London," says the Water and Gas Review, "all inhabitants were ordered to hang out lanthorns with candle, between Hallowtide and Candlemas." In 1680 a Mr. Hemming contracted to light certain streets with a new lantern having very thick convex glasses. These lamps were set up at every tenth house and lighted between Michaelmas and Lady Day from 6 p. m. until midnight and from the third day after full moon till the sixth day after the new moon. In 1736 a new act created a regular scheme for public street lighting, using oil lamps. In 1786 London boasted of being the best lighted city in the world. The great Dr. Johnson prophesied that the streets of London would one day be lighted by smoke, by which he intended to signify the gaseous vapor from coal. In 1803 Mr. Winsor publicly exhibited his plan of illumination by coal gas. The first public exhibition of the electric light was a failure. The Illustrated London News of Janaury, 1849, stated: "All hope of an extensive application of the electric light must now be abandoned; but we shall still rejoice if it can be employed as a special mode of illumination on great public occasions."

Five million dollars in cash and $20,000,000 in negotiable securities are carried across Beaver street, N. Y., twice every day, between the Seabord National Bank and the vaults of the Produce Exchange, while the bank is undergoing repairs.

ASCRIBES AMERICAN SUCCESS TO EDUCATION.

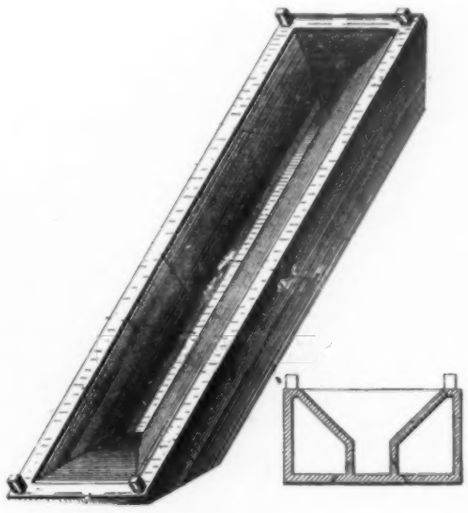
Alfred G. Mosley, C. M. G. A., will bring from England two industrial combinations of 25 members each, to witness and study American commercial conditions. Mr. Mosley said:

"It was years ago, when I was in South Africa, where I was associated with Cecil Rhodes, that I first came into contact with American methods. For years we worked those mines, both gold and diamond, without profit. Then the American engineers came along. They transformed the South African mines into the splendid dividend paying proposition they are now.

"That set me to thinking. I found myself obliged to confess at the start that the average American was a better educated and a more practically educated man than the Englishman. To this I attribute American success. The American not only works but he works intelligently."

BARGE WITH AIR CHAMBERS.

Here is the design of a barge with an air chamber running its entire length on both sides. The buoyancy thus obtained



makes the boat practically unsinkable, at the same time preserving the centre of gravity. It is adapted for carrying ore, coal, stone and similar cargoes of great weight.

Popular Mechanics

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AN ALMANAC OF CRIME.

A volume published by a foreign criminologist is called the "almanac of crime." Its object is to indicate those periods in each year when various crimes are most likely to be committed. Here are some extracts:

Murder.—Many cases of this crime occur in August, January and June; few in November, February and December.

Infanticide.—Dangerous periods are February and May; very few cases occur in September and December.

Poisoning.—May is the favorite month for criminals of this type. During September, as a rule, they remain absolutely idle.

Forgery.—During April, October and December forgers are most busy and also during the last days of every year.

Theft.—More crimes are committed in December and January than during any other months of the year.

FAMED POISONERS OF ANCIENT DAYS.

Famous poisoners of ancient days seem to have reaped as great a harvest as do the patent medicine manufacturers of the present time. Like them, their success was in the credulity of the people. There were those who sold the wonderful poison rings of Pompeii, whose touch to food or drink, they claimed, was sufficient to cause death. There was the preparation of arsenic, tasteless, colorless, odorless, that might be smeared on one side of a knife with which a peach was cut, the poisoned half being given to the victim, while the murderer could eat the other half with impunity. Then we are told of the drinking cup that turned wine into venom, and the looking-glass with the magical power of killing any one who looked into it. There were poisons whose action could be timed to a nicety; poisons whose evil influence would be exerted not immediately, but after months or even years; poisons that left no trace, and many others. It was to the interest of those who pretended to deal in poisons to magnify the wonder-working qualities of their remedies. Their credulous customers could make no public reclaimer if the drugs failed to accomplish their purpose. Like the vendors of the wonderful drugs that in our day are sold so commonly to change the course of nature or to develop the form, the presumed poisoners of former generations had little to fear from legal prosecution if their recipes proved unavailing. Such stories, says the Journal of the American Medical Association, are like the fairy tales, for advertising purposes, of the remedy that put in coffee cures the tobacco habit without the victim's knowledge.

THE HAREM AS IT IS TODAY.

Mechanical Inventions Work an Innovation in the Home of the Sultan and His 300 Beautiful Wives.

Late electrical appliances, other mechanical inventions and modern ideas are working a revolution in the Turkish harem. The sultan's mind is thus not entirely absorbed in thoughts of the hundreds of Circassian beauties that surround him. The sultan's wives are called sultanas. There are now but about 300 of them, as he has recently disposed of about 100 because they were growing old. The apartments of each sultana is equipped with electric bells; the imperial and the private harems are brilliantly lighted with electricity. The sultan, Abdul Hamid, may now talk to any of his wives over the telephone. The edifices are thoroughly equipped with speaking tubes, servant's call bells and almost every other convenience known to a modern American or European mansion.

Mrs. Horace Porter, wife of the United States ambassador to France, was recently entertained in the harem and she has furnished some interesting information on this mysterious abode. William E. Curtis, in speaking of the instance, says:

Ladies of the imperial harem wear European dress. They have French maids and order their gowns and hats in Paris. The apartments of the harem are equipped with European furniture. The meals are served in European style and the cooks are French. The French language is spoken generally among the sultanas and they read French novels. The traditional harem, in which houris sit around on silk rugs with their legs crossed and play guitars and eat sweetmeats, exists only in the imagination. The women live just like any other royal family, except that they are not allowed to receive company or enter society and when they leave the palace they must wear heavy veils. When the sultan's wives are ill they are attended by the male physician of the British embassy. This is also an innovation. Formerly no Christian physician was allowed in the harem. The patients are always veiled when the doctor visits them. Even if they are confined to their beds, strips of mull are thrown over their faces.

The sultan does not now contract regular marriages and the harem is a state institution. His wives are from the prominent families of the empire. When a rich pasha wants to secure the favor of the sultan, he offers him one of his daughters with a suitable dowry, as a wife, and if she is accepted it is a sign of friendliness as well as a mark of distinction. When the governor of the Circassian province, which is said to have the most beautiful women in Turkey, wishes to please his imperial master he will send him a handsome young girl as a gift, or when any of his subordinates discover a young woman of remarkable attractions they secure her for the harem, just as they would sesure a valuable horse for the imperial stables. The sultan does not always accept such gifts. He is supposed to be very fastidious, particularly now when he has reached the age of 60 years.

All children born in the harem are legitimate and of equal lineage and may inherit the throne if they ever become the head of the family, for, according to custom, the succession is vested in the oldest male in the royal family, whether he be son, brother or cousin of the reigning sovereign. Until a quarter of a century ago, all males of the imperial family, other than the sons of the reigning sultan, were put to death in order to prevent conspiracies and to remove them from the way of the oldest son. This wicked practice, however, was abolished by the present sultan, who thus far has shown himself to be humane and just.

The daughters of the sultan are married to favorite pashas and officers of the army.

The Illinois Central will build a double track road from Chicago to New Orleans, to be completed in two years.

RUINED BY FREE RURAL MAIL.

Say Small Towns Must Go and Only Big Cities and Farms Will Be Left.

Merchants of small towns claim that the free rural mail is ruining their business. According to their claims there will soon be no small towns. The country will be composed of only large cities and farms. That the farmer has been benefited, however, there is no doubt. Congress appropriated $40,000 for the service when it was inaugurated in 1896. The appropriation bill for the fiscal year carries $3,500,000. The New York Times gives the following interview with a storekeeper of a small town:

"This free delivery is acting as a sort of distributing agency for your big department stores. How can I compete with huge operations of such stores? These stores secure from the postmaster the names of all persons living in the postal district. To each and every one is sent a catalogue and price list. Farmers' wives pore over them more than they do over the Bible. They are thumbed and read as a wonderful fairy story. All available cash is dispatched to pay for things the farmer never heard of before and got along well enough without. Do you wonder that the country storekeeper is not sharing to the fullest in the prosperity of the country?"

STEEL RAIL THE SECRET OF AMERICA'S GREATNESS.

The invention of the steel rail is to make America the leading commercial nation of the world, according to Franklin H. Head in a recent lecture. He predicted that the open-hearth process of making scrap iron into steel would replace the Bessemer process, because cheaper and because such steel, he said, is better than the Bessemer.

"Commerce," said Mr. Head, "is the source of all wealth and development. For the last seventy years England has been the leading nation in commerce. But the development of the last two or three years show that England has got to look out if she wishes to keep that supremacy. It looks as if the United States is going to be the dominant nation of the world; if this is so, it is owing to commerce and our commercial power is owing to the invention of the steel rail."

CRYSTALIZED COAL TO STOP SMOKE.

Commodore O. P. Howell, U. S. N., believes he has made a discovery that will forever abate the smoke nuisance. His plan is to crystallize soft coal into lumps from three to ten inches in diameter and extract the gaseous substances. The coal is to be reduced to a powdered state. This is then heated and mixed with other material and subjected to a hydraulic pressure of 20,000 pounds to the cubic inch, which produces a density of 95 pounds to the cubic foot. Successful tests have been made in the presence of capitalists who are preparing to enter extensively into the manufacture of the blocks. Besides making practically no smoke, the coal subjected to the process burns three times longer than loose coal and the volume of heat is greatly intensified.

The inventor says that the blocks can be manufactured from refuse coal at mines, either from bituminous or anthracite coal with equal success. It costs not to exceed 40 cents per ton to manufacture the crude material at the mine into the finished product. As soft coal can be used in the manufacture of blocks equally as successfully as hard coal, the finished product can be placed upon the markets of the Eastern cities at a lower rate than is now being paid for anthracite coal.

The only known grave of a passenger of the Mayflower has just been discovered in an old cemetery at Salem, Mass. The gravestone is inscribed: "Here lyeth buried ye body of Capt. Richard More, aged 84 years."

LOCOMOTIVES OF A CENTURY

[Being an illustrated history of locomotive invention, building and progress. The facts are taken from a paper by S. M. Vauclain, read before the New England Railroad Club. The illustrations were gathered and engraved by the Baldwin Locomotive Works, by whose permission they are used.—Editor P. M.]

Stevenson is generally looked upon as the "father of the locomotive." He, it is claimed, invented the T rail, and Stevenson's "Rocket" (Fig. 6) is by many regarded as the first real locomotive.

The locomotives thus far described in this and the preceding

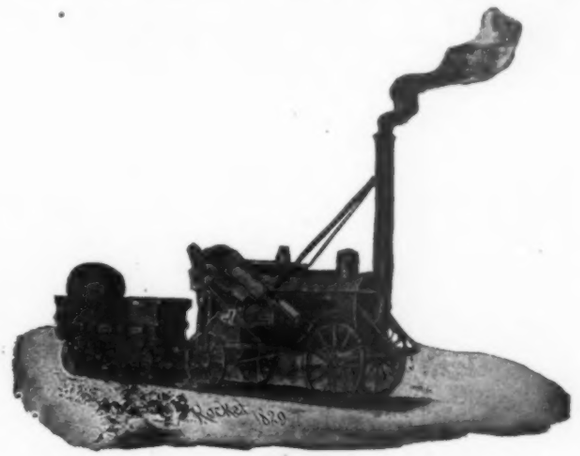


FIG. 6—STEVENSON'S LOCOMOTIVE, "ROCKET" 1829.

issues were all of English invention. We will now turn to America, where the railroad and all that pertains to it has made the most rapid progress and attained its highest state of perfection. The "Howard," in 1830, was the first locomotive to be built in America. It was designed by a civil engineer of the Baltimore & Ohio Railroad, which was then little more than a

FIG. 7—PETER COOPER,S MODEL, 1830.

tramway operated by horses. In the same year Peter Cooper successfully operated his experimental model (Fig. 7). He was followed by Johnson, Milholland, Winans and other great inventors of that day.

But it was a jeweler whose great sagacity and business energy

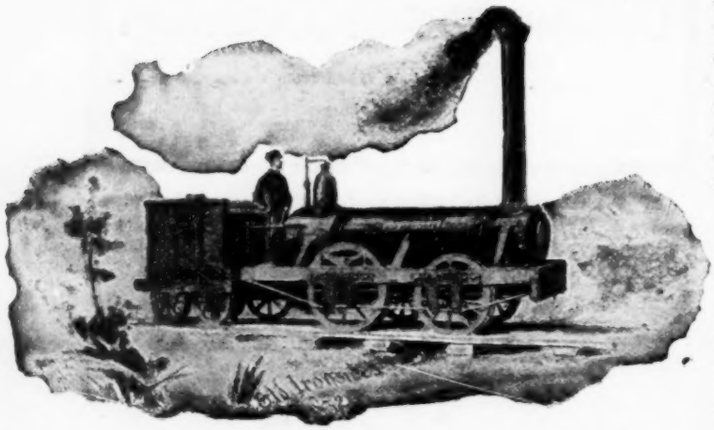


FIG. 8—BALDWIN'S LOCOMOTIVE, "OLD IRONSIDES," 1832.

enabled him to establish at this early day a locomotive works to produce under contract locomotives for a fixed price. His work was so well done, his many inventions so necessary and useful, and his business policy so accurate and well defined that his successors have been able, by adding thereto their meager contributions to the art, to perpetuate his workshop until today in placid Philadelphia we have the largest locomotive works in

FIG. 9—LOCOMOTIVE WITH STEVENSON'S LINK, 1832.

the world. The Baldwin product is familiar to every country in the world, with a capacity of more than 1,200 locomotives annually, which is 40 per cent of the entire American production; and all an evidence of the sound engineering and business sagacity of the founder.

The "Ironsides" (Fig. 8) was a single driver locomotive, a

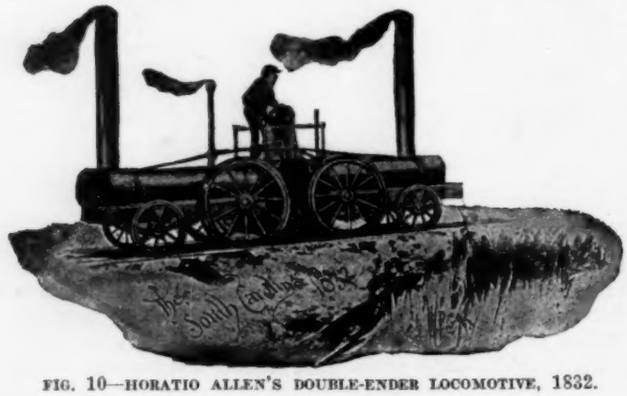


FIG. 10—HORATIO ALLEN'S DOUBLE-ENDER LOCOMOTIVE, 1832.

type which prevails even today and gives most excellent service where the traffic is light. James, of New York, in 1832, first applied the Stephenson link to a locomotive (Fig. 9). Horatio Allen's eight-wheel engine (Fig. 10), built in 1832, is the forerunner of the modern Fairlie class of locomotives. The same aversion, however,—that to complication, common to all Americans—sealed its fate, but the device marks another step in the art.

HOW THE EARTH'S HEAT MAY BE USED FOR POWER.

The Thermo-Electric couple, when perfected, may solve the problem of utilizing heat from the center of the earth as a source of power, mentioned in the last issue. In Cassier's Magazine it is stated that if the couple can be made to generate power to run large enterprises, a hole similar to an oil well could be drilled into the surface of the earth a mile or more and the instrument, with the attached wires, lowered until the heat was sufficient to give the desired amount of energy.

The principle of the thermo-electric couple is simple. When a change of temperature occurs at the junction of two slips of dissimilar metals an electric current is excited in them. Many inventors have endeavored to turn that phenomenon to account. Clamond built up a hollow cylinder out of alternate layers of tin and an alloy containing antimony and heated the interior with a gas flame formed around a perforated earthenware tube. Harry B. Cox of Hartford has constructed a somewhat similar battery, which may be run with a gas jet and left alone for a month at a time. The Postal Telegraph tested it and fonud that it would work a telegraph wire. These and other thermo-electric batteries, however, have thus far failed to generate currents cheaply, but it is hoped that experiments still in progress will lead to the discovery of the valuable secret. The possibilities it holds out, such as giving us heat, power and light from the earth's center, are so great as to cause many of the present day to look upon it as incredible.

HOW MAPLE SUGAR IS MADE.

Lillian C. Chase of East Fletcher, Vt., gives the following interesting description of the process of making maple sugar in her state:

It is an industry that will surely become extinct unless something can be done to preserve our maple trees or make it worth while to raise and nurse sugar orchards with the same care given fruit orchards.

A good "run" of sap means toil night and day while the sap lasts, though we seldom "boil" the whole night, as we were obliged to do before we had modern conveniences. We tap the trees, making a half-inch hole, and the sap drops into the buckets. It is emptied into large tubs fastened to sleds and drawn to a covored building, in which are evaporators. The sap flows constantly into one end of a corrugated pan and is drawn out at the other end as sirup, ready for the market or to be made into sugar. This sirup is then placed in a large pan over another iron arch, like that for evaporator, and boiled till thick enough to grain. It is dipped into small pans while boiling hot and stirred with wooden paddles till well grained, then poured into the molds or tubs.

Most of it is made into two-ounce cakes. Each cake has to be lifted from the mold to cool on all sides. Then the edges are trimmed with a knife and they are packed in different-sized boxes ready for shipping.

The quality of maple sugar varies with the season, the very first and last being the poorest. The color depends principally on the care of the makers in straining the sap and sirup to take out the "nitre," a sandlike sediment which is always present. The best maple sugar is a light brown color about the shade of sandpaper.

HOW ROQUEFORT CHEESE IS MADE.

The Genuine Is From Sheep's Milk and Cured in a Great Cave Near Roquefort, France.

France is foremost among the countries of the nations of the world as a maker of high class cheese. Sheep's milk, goat's milk and cow's milk furnish the material for the manufacture of 300,000,000 pounds annually. Of this 14,000,000 pounds is exported each year. From sheep's milk the famous Roquefort cheese is made. Most cheese sold in America as Roquefort is made of cow's milk and is imitation. The genuine Roquefort is made from the milk of the Larzac sheep and derives its name from the little village of Roquefort in Southern France, which has been the central point of its manufacture since the first century of the Christian era. Roquefort cheese used to be carried from France to the markets of Rome.

The Larzac sheep are grazed by the tens of thousands upon the hills and mountains of Aveyron and adjoining departments. The curing, says Henry E. Alvord, chief of the dairy division, United States Department of Agriculture, is accomplished in the famous natural cave in the mountain behind the village of Roquefort and the large vaults lately built in connection with and supplementary to these caverns. The cool air currents, even temperature and peculiar atmosphere of these caves cause the slow ripening and development of greenish blue mold, which gives the cheese its characteristic appearance and flavor. The cheeses are round, about 8 inches in diameter and 4 inches thick, the average weight being 4½ pounds. When cured the body of the cheese is quite soft and an ivory white, except as it is marbled by the growth of mold. The finishing and marketing of the Roquefort product is now mainly in the hands of two large companies, having abundant capital, the total output being more than 3,000,000 cheeses annually, or about 6,000 tons. While Paris is the chief market, cheese is shipped direct from Roquefort to all parts of the world.

AUCTION SALE OF CHEESE AND BUTTER (IN MOTTES) AT PARIS MARKET.

(From Report of Henry C. Alvord, U. S. Dept. of Agriculture.)

Other famous cheeses of France are the Gruyere, Emmenthal, Cantal and Port Salut. The manufacture of the Gruyere has been a leading industry of the Jura mountain region for centuries and also in the Doubs and Upper Savoy. Its production in this region amounts to 44,000,000 pounds a year. This cheese bore the name of "Vachelin" until the beginning of the 19th century.

COOKING THE CURD FOR GRUYERE AND EMMENTHAL CHEESE.

(From Report of Henry C. Alvord, U. S. Dept. of Agriculture.)

OPPOSITION TO MARCONI SYSTEM.

Marconi is not to have exclusive control of wireless telegraphy as applied to marine work. Aside from the organization of an independent company to operate on the Great Lakes, the American Wireless Telegraph and Telephone company began at the Highlands of Navesink, April 1, the construction of a tower for the reception of messages from incoming steamers to New York. In order to build the company was obliged to purchase eight acres of land. The tower is to be 130 feet high and is to have a base of 40 feet.

$3,000 TIP TO A BARBER.

J. B. Duke gave a tip of $3,000 to a colored barber who shaved him on his arrival at Durham, N. C., a few days ago. The barber was an enthusiastic member of St. Joseph's Methodist church. While being shaved Mr. Duke learned that the church owed $3,000 and a check was given to pay off the indebtedness.

JUDGE LETS JURY GO TO A FIRE.

In Passaic, N. J., the district court house and the principal fire station are not far apart. A trial was on in the court a few days ago when ex-Assistant Foreman William McAllister of Truck No. 1 was foreman of the jury and Assistant Foreman Frylinck of Engine 1, and Firemen Charles Lutz and John Catline were on the jury. They were listening attentively to the important evidence when there was a still alarm; the truck rolled out and the firemen squirmed in their seats. Other jurymen laughed at the firemen's discomfiture. Then came the chemical engine and the firemen jurymen grew more impatient. Some one in the hall screamed "fire." The jurymen almost left their seats. Judge Watson took in the situation and turning to the jurymen said: "Gentlemen, you are excused for an hour and a half." The firemen rushed to extinguish the flames and the judge went to lunch.

STRANGE JELLY ON THE MARKET.

"Strange flesh" and strange coffee, mentioned in preceding issues of Popular Mechanics, are not the only adulterations the American people have been deceived in these many years as a result of unscrupulous dealers. The latest fraud exposed by the investigation at Washington is strange jelly. The representative of a wholesale grocery firm in Chicago testified that the jellies he sold were made from the skins and cores of apples mixed with glucose. The result was then put up in 30-pound pails and sent out to customers with any label they preferred. The firm was good natured about its labels. It deferred entirely to the wishes of the customer.

The Submarine Diver and His Outfit

(From data supplied by A. J. Morse & Co., Boston, Builders of Diving Apparatus for the U. S. Navy.)

Two hundred and four feet beneath the water's surface is the greatest depth ever attained by a submarine diver. This was made possible by the latest improvements in armor, air supply, weights, life-lines, etc. In an effort of a diver to reach a wreck in 240 feet the diver experienced serious trouble at 130 feet and lost consciousness soon after passing the 200-foot depth.

Last week we examined the wardrobe of the diver, dressed him for a dive and sent him down. But it was only a short distance, say 30 or 40 feet. Then he begins to go deeper the dangers and difficulties increase rapidly. For while shell fish of the most delicate nature have been dredged from great depths they burst and die on being brought to the surface; and man who is constructed to live in the air would be crushed, and his muscles powerless to work his lungs at a few hundred feet, even though supplied with plenty of air and in the best diving armor ever made. These are some of the pressures per square inch at various depths: 20 ft. 8⅛ lbs.; 30 ft., 12¾ lbs.; 40 ft., 17¼ lbs.; 50 ft. 21¾ lbs.; 80 ft. 34¾ lbs.; 100 ft. 43½ lbs.; 150 ft. (limit) 65¼ lbs.; 204 ft. (greatest depth any diver ever descended) 88½ lbs. For great depths the air pumps are driven by steam power instead of by hand. From the pressure indicated on the air pump gauge, one can easily calculate the depth at which the diver is working. The armor and weights will weigh 240 pounds.

The first time a man descends under water he is usually suffering from inherent nervousness, occasioned by the fact that he is engaged in an occupation hitherto unknown to him, consequently there is an increased pulse and peculiar gasping for breath; should these symptoms be marked it is not advisable, while in that condition to allow the man to descend. When the nervousness is overcome and the man calm, have him descend very slowly, swallowing his saliva and not demanding too much air, resting at times to recover his

ANCHOR WEIGHT.

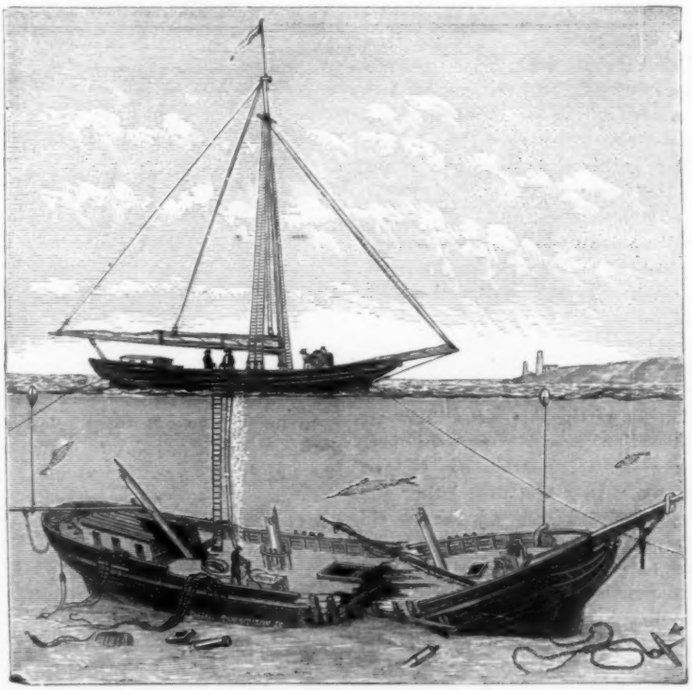
equilibrium; and if the pressure should cause too much pain in the head, gently ascend a few feet, and the descent can then be continued.

The constitution of the diver will regulate the manner of his coming up. A man at all sanguineous should ascend slowly; the brain being suddenly relieved from the pressure causes a rush of blood to the head, and it may cause serious consequences. We would advise that a diver, a strong constitutioned man, should not ascend at a rate of over 2 feet every second. This course applies only to depths not exceeding 80 feet; greater depths require more care in descending and more time in coming up, according to the increase in depth up to the limit of 150 feet. In ascending from very deep water, the diver having been in a condensed atmos-

IMPROVED DIVING HELMET, WITH TELEPHONE, BATTERY AND CABLE.

phere, and time shuold be given for the muscles and tissues of the body to be relieved of the pressure by very slowly ascending, or frequently stopping for a time at certain stages, to allow the body to be relieved of the greater pressure acquired while working in the denser atmosphere, or to establish, as nearly as possible an equilibrium between the pressure absorbed and the actual pressure of the water he may be resting in.

No diver should take any food for at least two hours before commencing operations. If any kind of refreshment be required, a biscuit, or dry cracker, with a small amount of fluid, or anything that will not excite the digestion, may be taken during work.



THE DIVER AT WORK.

An eminent medical authority says: "The men who work subjected to great pressures should not eat one ounce more of animal food than is needful to maintain their strength, as, in my opinion, should they eat too much it increases the tendency to apoplexy. The bowels should be kept regular, as when they are unduly gorged they press upon the diaphragm, obstruct the action of the lungs and respiration, which leads to an embarrassed circulation of the blood and a whole series of evil results."

From an experience of many years, we have no doubt that diving is not injurious when conducted under ordinary precautions, and we have known of instances where divers, who in their youth were sickly, have become strong and well, which can only be attributed to the effect of compressed air upon their lungs, and the body in general, as absorbing a greater amount of oxygen, from the compressed air. It also promotes digestion, owing to the greater quantity of oxygen carried into the blood.

Before a man attempts diving he should have a medical examination. Those who come under any of the following classifications should not undertake diving: Men with short necks; full blooded; who have headaches or are slightly deaf; who have spit blood or have palpitation of the heart; men with blood shot eyes or high color in cheeks; men who are hard drinkers, or who have had rheumatism or sun stroke.

Thus we see the dangers found in this occupation are vastly more within the man himself than attacks from without by sharks and other monsters of the deep that we have been accustomed to read about.

SWEDISH OILING APPARATUS.

T. F. Malmros, of Gothenburg, Sweden, has devised a successful system of oiling piston rods, cylinders, slide rods, and slide guides on locomotives. It consists in intermixing oil and steam, coming through the central steam-lubricating apparatus, through glander bushings expressly constructed for this purpose. The system has been tested on one of the express engines of the state railroads with such good results that all locomotives of the state railroads are to be equipped with the oiling apparatus.

British iron manufacturers have started a movement to form a gigantic combination to fight American pig iron and steel, for which there is a wonderfully growing demand across the sea.

TIRED OF HEWING PULP FOR UNCLE SAM.

Canada is angry at being placed in the position as a hewer of pulp for the United States. The Canadian Forestry association therefore has emphasized its demands for stopping Canadian pulp supplies for American paper mills. It is claimed that the United States manufacturers are annually taking about 1,000,000 cords of pulp wood from Canada at $3.50 per cord, which in the shape of finished products represents expenditure in the United States for American labor and material and profits for American manufacturers exceeding $30,000,000.

In Canada pulp wood in the raw is free of duty. The lowest form of manufacture, known as mechanical pulp, has a duty of $1.67 per ton imposed on it; chemical pulp pays $3.33 per ton, while the duty on paper is prohibitive. It is estimated that an adequate duty put on Canadian pulp wood or pulp would result in the establishment of twenty paper factories in Canada, representing a cash investment of $8,000,000.

WHICH FOOT IS THE LARGER?

The Shoe Trade Journal has got into an argument with itself about which of a person's feet is the larger. It was formerly held, it says, almost unanimously that the left foot led the right one in size; but recently this opinion has been assailed by some physicians and shoe men. The journal quotes a retailer who says that in the case of workmen who strike blows with hammers, picks, or other tools, the left foot is the larger, because the man throws his weight on this foot when he delivers the blow and thus causes it to enlarge by muscular development. The majority of people when purchasing shoes, however, have only the right shoe tried on, in the belief that the right foot is larger and that if the shoe fits that foot it will fit the other.

INDIANS FLY FROM MOTHERS-IN-LAW.

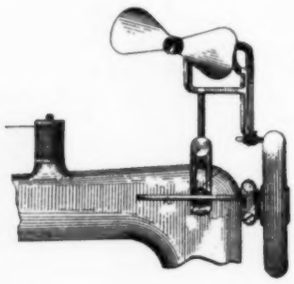
A Navajo Indian will not enter a house in which there has been a death, and, as a consequence, his country is full of abandoned huts. After marriage these Indians dare not look upon their mother-in-law. The most dangerous consequences would, in their opinion, follow even a momentary glimpse of them.

Accident sometimes brings about this most undesirable encounter. In such an event severe fasting and praying alone can avert evil effects. It is not unusual to see a dignified chief run like a frightened boy to avoid the dreaded sight.

In 50 years the average height of the English has increased from 5 feet 7½ inches to 5 feet 8½ inches.

FAN ATTACHMENT FOR SEWING MACHINES.

A fan attachment for sewing machines has been invented by George Geer of Richmond, Va. The fan is fastened to a frame supported on the machine-head and is operated by the turning of the balance



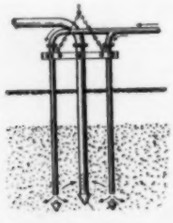
wheel by means of a friction disk on the fan-shaft engaging the balance wheel. The support is so arranged that it may be turned to hold the fan at different angles and elevations as may be desired by the operator of the machine.

MAKE BIRDS PHOTOGRAPH THEMSELVES.

Birds are made to take photographs of themselves by the ingenious device of an English photographer. A piece of fat is placed at the end of a wire electrically connected to the shutter of a camera. Timid birds, like the song thrush, will approach the bait and pick it up, and at once the shutter is moved by this action and an instantaneous exposure obtained. To get photos of nocturnal birds the wire is arranged to light a little magnesium as it releases the shutter.

PROCESS OF PREPARING FOUNDATIONS.

This is the idea of a Russian. Where foundations are to be laid in very wet soil or quicksand where excavations can



only be made with caissons he drives three pipes to the required depth. Through two pipes liquid cement is pumped, and at the same time water is drawn out by means of a pump attached to the middle pipe.

The "Sommersault cure" for obesity is the latest in London. A West End surgeon has fitted up a luxurious gymnasium where very fat ladies come to turn somersaults to reduce their flesh.

DERELICTS IMPERIL NAVIGATION.

Just how many derelict vessels are drifting about on the waters of the oceans no one knows; no record of them is kept. The dread of all sailors, they wander at randum, often crossing the ocean, and sometimes acting in such a strange manner as to cause them to be looked upon with a degree of mystery. Many boats have sailed from port never to be heard from again. Such a fate befell the Chicora with her passengers and crew on Lake Michigan, and many other vessels on the Great Lakes have been swallowed up so completely that not a vestige of them has ever been seen or heard from. Some believe that these mysterious disappearances of ships on the oceans, lakes and seas are caused by derelicts. That many disastrous wrecks have resulted from their pathless wanderings is well known. It is estimated that there are aboue fifty derelicts now being wafted about on the waters of the Atlantic Ocean. Probably there are twice that many in the Pacific Ocean. Other oceans and smaller bodies of water of Europe, Asia and Africa have probably 300 derelicts that may make their way into any of the connecting waters at any time. In the lakes, seas and gulfs of the Americas there are no doubt half a hundred more of these stray impediments to navigation, making a total of 500 vessels that drift hither and thither about the waters of the world guided only by the wind and currents.

"A ship to be legally a derelict," says the Coast Seamen's Journal, "must have been abandoned not only without hope of recovery, but also without any intention upon the part of returning. It has been said that no vessel is a legal derelict if a live cat or dog can be found upon it, for the presence of either animal is supposed to be evidence that the crew intends to return.

"For many years we have had on land a civilian army, a part of the duty of the members of which is to arrest those individuals who are dangerous to others or to themselves. Has not the time been reached when a system of maritime police should be inaugurated by the ship-owning nations of the world for the purpose of protecting vessels from such dangers as derelicts? The subject ought to be thoroughly investigated and reported upon with as little delay as possible."

ANOTHER FRAUD EXPOSED.

"Deer surs," she wrote to the medicine firm, "my husband was all run down. We tride your selabrated compound three botls, but it done no good. He's ded. So I brand you as a frod. Mrs. J. Pauking.

"P. S. He was run down by a ottomobeal."

INVENTS A CLOTHES-LINE REEL.

A clothes-line reel that will wind up the rope as expeditiously as the fishing line is wound by the angler's reel has been invented by Paul Krex of South Bethlehem, Pa. It consists of a frame and

a pivot on which the line is wound and which is turned by means of an exterior arm. The line is attached to a strap on the shaft. A ratchet-wheel within the frame holds the line in place and enables it to be thrown out when released. The device makes it possible to draw a clothes-line tightly and hold it fast.

ENOUGH ARSENIC TO SUPPLY THE WORLD.

Deposits of arsenic in the vicinity of North Hastings, Ont., are sufficient, it is claimed, to supply the world with the drug. The Ontario government has been petitioned to have arsenic placed on the bounty list in the belief that it would induce the investment of immense capital.

AMERICAN EXHIBIT AT LONDON.

F. C. Van Duser, secretary of the American Society in London, reports that an American exhibition at the Crystal Palace is assured, and says that more applications have been received than can be granted. The number and variety of the exhibits to be made will be representative of the best manufacturers of America.

ELECTRIC GRAIN ELEVATOR.

The Princeton (Ind.) Elevator Co. is operating what they believe to be the largest electric grain elevator. It was formerly run by steam power. Electricity is cheaper and safer.

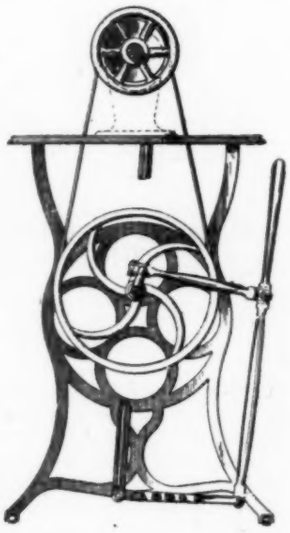
The German government has virtually placed a ban on the Marconi plan of wireless telegraphy. The Kaiser will have the German warships equipped with the Slaby-Arco system.

PEAS AND SAWDUST FOR COFFEE.

More fraudulent adulterations of food are being brought to light by the government investigation at Washington. Alleged Java and Mocha coffee, sold by many leading dealers, was found to be nothing more than an unholy union of peas and sawdust. This is what the American people have been boiling for a breakfast beverage. Very little real Java and Mocha coffee can be found throughout the extent of the country. Some of the fraudulent dealers have been considerate enough to substitute Brazil coffee, which through cheaper, is really coffee. Other adulterations were made by a mixture of cereals and molasses.

RUNS SEWING MACHINE BY HAND POWER.

Willie's troubles grow apace, and more and more each day; for though the grindstone he has turned, still cannot go and



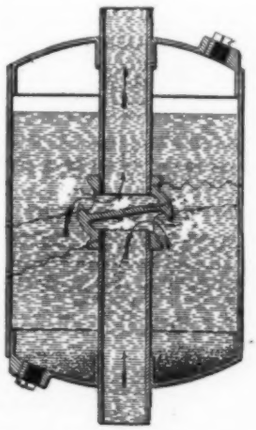
play. For now his mamma has a scheme and when she wants to sew, she calls to Willie boy to come and make the machine go. The grindstone turns 'round with a crank while this goes forth and back, between the two there's little chance that he for work will lack.

OF INTEREST TO PHOTOGRAPHERS.

A simple and effective process of backing plates is thus described by H. L. Maloney in the Photo-Beacon: I have ready several sheets of black or brown paper, cut a very little smaller than the plates. Then I take a shaving mug and place a round cake of shaving soap in it and then stir up a lather with a shaving brush. I spread the lather on the sheet of paper with the shaving brush and place the paper on the plate and roll into contact with a print roller; then I wipe the lather from the edges of the plate and place it in a drying box; if in a hurry, I place it in the plateholder. At once the lather, if properly made, will hold the paper to the plate without danger of its coming loose, and in no other process can the backing be so easily or quickly removed. All that is necessary is to slip a knife blade under one corner and peel the paper off, then with a damp rag remove the film of soap from the plate. The papers can be used many times.

SAND TRAP FOR DRIVEN WELLS.

A sand trap for driven or artesian wells is the invention of Benj. F. Smith of Som-



erville, Mass. The flow of the water as shown by the arrows is such as to deflect the sand to the bottom of the trap, while water is directly pumped only from the upper half of the trap.

PURGED OF MOSQUITOES, HAVANA IS HEALTHY.

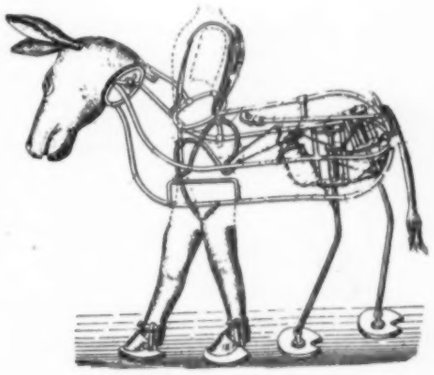
Destruction of the germ-bearing mosquitoes has purged Havana, Cuba, of yellow fever and made it one of the healthiest of cities. A statement issued by the insular division of the war department shows that the death rate has decreased from 21,252 a year to 5,720 a year. The report states:

"The army took charge of the health department of Havana with yellow fever epidemic for two centuries. It found Havana feared as a thing unclean by all her neighbors of the United States, and quarantined against as too dangerous to touch, or even to come near anything that she had touched, to the untold financial loss of both Havana and the United States. It has established the fact that yellow fever is only transmitted by a certain species of mosquito, a discovery that in its power of saving human life is only excelled by Jenner's great discovery, and as time goes on it will stand in the same class as that great boon to mankind."

Agents wanted in every town to represent Popular Mechanics.

A MECHANICAL MULE.

This mechanical quadruped was invented in Germany and is for use on the stage. The fore legs of the animal are those of



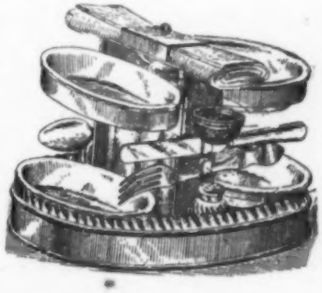
the performer himself. The hind legs are worked by a lever system attached to the legs of the operator. When he lifts his left foot the right hind foot also raises. His hands are free to guide the beast and a pair of artificial human legs complete the principal necessities.

A BILLION TELESCOPIC METEORS DAILY.

Small meteors in considerable numbers are noticed by every person engaged in telescopic observations. Dr. See, of the Naval Observatory at Washington, estimates that 1,200,000,000 of these telescopic meteors appear in the whole sky daily. From ten to fifteen million meteors, bright enough to be visible to the naked eye, encounter the earth daily, according to the calculations of Prof. Newton. Most of these are consumed in the atmosphere. The increment to the mass of the earth is exceedingly small.

COMPLETE DINNER PAIL.

This is the idea of Henry C. Atkinson of Louisville, and contains in compact shape



napkin, dishes and the indispensable dining utensils.

The plague now raging in India, according to information from Lahore, is the worst on record. The mortality is said to reach 2,000 daily.

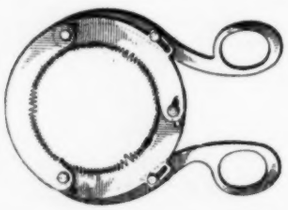
FOR THE MADAM

HOW TO PREPARE POTATOES.

No. 3.—Potatoes a la Maitre d'Hotel: One quart of cold boiled potatoes, cut into dice; one scant pint of milk, one tablespoonful of chopped parsley, three of butter, one teaspoonful of lemon juice, salt, pepper, the yolks of two eggs, one teaspoonful of flour. Mix the butter, flour, lemon juice, parsley and yolk of eggs together. Season the potatoes with salt and pepper. Add the milk, and put on in the double boiler. Cook five minutes; then add the other ingredients and cook five minutes longer. Stir often.

EGG OPENER.

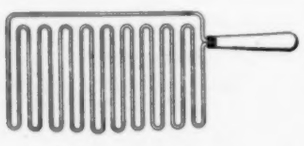
This little device, which is the invention of H. S. Dotts, Thoburn, W. Va., consists



of a pair of saw knives with small sharp teeth working in opposite directions and operated like the handles of a pair of scissors.

HAIR DRYING DEVICE.

This device is made of parallel tines of wire which are held by a handle, producing



a mammoth comb. The manner of its use is self-evident. W. W. Cowley, Cleveland, is the inventor.

GOOD FURNITURE POLISH.

An excellent recipe for furniture polish is given in the Furniture Journal, as follows:

Two quarts white wine vinegar, 4 oz. butter antimony, 2 oz. oil merbane, 8 oz. light sperm oil (very thin), 1½ quarts soft water. Mix and shake well.

For bruised surfaces that need repolishing use the following with a pad same as French polishing:

Take 1 quart of above compound. Add 6 oz. sperm oil, 4 oz. rotten stone pulverized, 1 oz. tripoli pulverized.

MUSIC CONQUERS A MADMAN.

Louis Coleman, a smallpox patient in the St. Louis pesthouse, in a fit of delirium, attacked the attendants and patients, brandishing an ax, with which he smashed all the beds and furniture in his ward and adjoining rooms. The nurse was knocked down. Health Commissioner Fisher, with a corps of assistants, finally succeeded in overpowering the man and tied him to a bed post. Coleman continued to rave; opiates were administered without effect; he writhed and struggled and yelled until the attendants declared they were "powerless to do more."

"Perhaps music will calm him," said Charles Hatfield, one of the attendants. With that he procured a violin and began to play "Sober Las Olas," (Over the Waves), the tuneful Mexican waltz. Soothed by the strains, says the Presto, Coleman gradually qnieted. The violinist kept on playing and the knotted cords in the patient's muscles relaxed slowly. His hand fell to his side. He rested his hand upon his pillow, stretched his limbs as far as he could, bound as he was, heaved a deep sigh and sank into a sound sleep. He slept for several hours, and when he awoke the fever had abated and the patient was rational and passive. The attendant, Charles Hatfield, is still receiving congratulations on the charm worked by his violin.

AN HOUR OF AWE FOR OAKLAND, N. J.

All Oakland, N. J., waited in awful suspense for an hour a few nights ago while a quantity of nitro-glycerine was burning in the acid house of the Oakland Smokeless Powder Works. The residents rushed from their dwellings and none dared venture closer than 400 yards from where the deadly explosive was on fire. Struggling for places behind distant houses and knolls, they momentarily awaited the expected explosion that they thought would almost annihilate the whole town. Minutes and an hour passed and the nitro-glycerine burned away as quietly as logs of wood. When the flames abated twelve men gathered courage to approach the seat of alarm and run out a line of hose to play on the burning building. Others dampened the gun cotton, which was kept in separate magazines. The fire was extinguished and no one was hurt. It is another instance of the freaks a fire will play.

The revolver with which President McKinley was killed, with the cartridges and the handkerchief with which it was concealed when the fatal shot was fired, are preserved in the museum of the Buffalo Historical society.

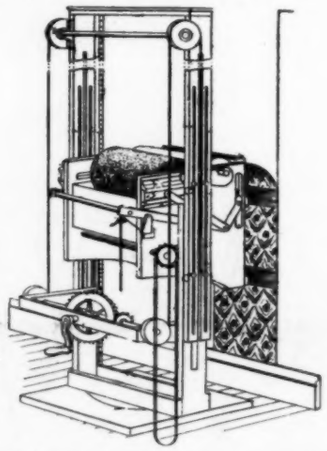
FOR SOME ONE.

I wonder why I toil away?
My heart replies: "For some one!"
Why may I never rest a day?
Because—because of "some one."
I hear the tramp of many feet,
I hear the racket in the street,
But over all I hear the sweet—
Sweet little laugh of "some one."

His work is never hard to do
Who thinks all day of some one;
He labors well whose heart is true—
And fondly true—to some one!
Men strive for wealth—men bravely go
Where danger is for fame, but oh!
The sweetest joy a man may know
Is just to toil for some one!

WALL PAPERING MACHINE.

A Cleveland man has built a machine in which a roll of paper is placed, and when a crank is turned the paper is trimmed, covered with paste, laid against the



wall and firmly brushed into permanent position. When the ceiling is reached a knife cuts the roll, and the apparatus lowers and is moved along for the next strip. The machine can be adjusted to a very small fraction of an inch to make the paper designs match..

WILL DRIVE EAGLES TO AN AIRSHIP.

What the horse is to the land the eagle is to the air, declares Prof. Kaiser, a mechanical genius of South Germany, and he is training a team of a dozen eagles to steer a balloon. The professor has published a pamphlet on "How to steer an Airship with Eagles." By means of numerous diagrams and elaborate calculations he shows how eagles can be harnessed and the weights they can pull through the air. The pamphlet is received with ridicule in Germany, but it does not daunt the ardor of the professor, and he is going ahead with his plans to drive eagles to his balloon.

Queen Alexandra has gone to Denmark to attend the celebration of the 84th birthday of her father, King Christian IX of Denmark.

Fifty cents a year. Send five cents for a sample copy to George H. Daniels, G. P. A., Grand Central Station, New York.

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We have boiled the hydrant water,
We have sterilized the milk,
We have strained the prowling microbe
Through the finest kind of silk;
We have bought and we have borrowed
Every patent health device,
And at last the doctor tells us
That we've got to boil the ice.
—Medical News.

There are many things that happen
To make a fellow glad;
There are many things that happen
To make a fellow mad;
But the saddest thing on record,
As if decreed by Fate,
Is the breaking of a shoestring
In the morning, when you're late.
—Shoe Trade Journal.

CALF WEANER.

When new this is a very bright idea and Mrs. Cow will readily comprehend the point of the joke without conferring with

the neighbors. The inventor says it "comprises a nose strap with prods and fixed prickers arranged adjacent to the prods, with movable prickers dispersed on either side of the center prod." It certainly does have that appearance.

ORIGIN OF THE TIN SOLDIER.

The gay little tin soldier which comes to us from across the sea had its origin in extracting the solder from old sardine cans, and restored a fortune to a Frenchman who was made a bankrupt by the Franco-German war. After the siege of Paris by the Germans, says Harper's Weekly, the keeper of a Parisian wine shop found himself completely ruined. In his prosperous days he ate sardines at nearly every meal, and great stacks of the cans were in his back yard. He learned that the solder with which they were hermetically sealed was a valuable commodity. He improvised a small furnace, and after experimentais soon was placing the solder on the market. He contracted for all the old sardine cans that could be brought to him, and in a short time found himself at the head of a prosperous business. Then it occurred to him that there was a lot of waste in the tin that was thrown away after the solder had been extracted. The thought occurred to him of making tin soldiers out of the waste. The result was the establishment of several factories in different parts of France, and the man is now a muti-millionaire.

THE FAST FREIGHT.

Railroad Classification.—"But," we protested to the general manager of the One Horse railroad, "you advertise fast and slow freights, yet you tell us you only run one freight train a day. How is that?"

"Well," he answered, "we put the fast freight in the front cars, and it reaches the town ahead of the slow freight."

THERE HE GOES
OR,
HERE HE LIES?

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"Want" and "For Sale" Ads. 10 cents per line payable in advance. Replies may be sent to a number, care Popular Mechanics, and will be forwarded promptly without extra charge.

SPECIAL.

THE OZARK LIVE STOCK COMPANY has $3 of good assets for every dollar of stock issued. It owns 1,350 acres of land and has the right to graze on 30,000 acres more. Its originators cleared last year 200 per cent profits on the money invested. Shares $10, sold at par. Write them care 109 Hartford Building, Chicago. The best investment on the market.

ENGINEERS, FIREMEN, MACHINISTS and Electricians send for 40-page pamphlet containing Questions asked by Examining Board of Engineers to obtain Engineers' license. Address Geo. A. Zeller, Publisher, room 502 18 S. 4th St., St. Louis, Mo.

BUSINESS CHANCES.

FOR SALE—Patent 695,277. A safety switch for overhead track in slaughter houses for beef and pork cold storage or warehouses. Address W. L. Clark, 199 Broadway, Everett, Mass.

WANTED—Second-hand hook and ladder truck. H. R. Porter, Sec., Board of Fire Commissioners, Suffern, N. Y.

Cruising and racing catboat can be bought at less than half the cost to build. Frank Browne Jones, 29 Broadway, N. Y.

MECHANICS, don't stamp your tools. Cut your name on them with Hercules etching fluid. Temper no obstacle. Full directions and receipt for 25c. Address J. G. Campbell, Topeka, Kas., 305 Chandler St.

FOR SALE—Iron tripod electric tower 125 feet high. Corsicana Gas & Electric Co., Corsicana, Texas.

FOR SALE—Tin shop, tools and stock. Lock Box 23, Cerro Gordo, Ill.

35-HORSE BOILER, 25-horse Bocky engine for sale. Gardner, 523 Blum St., Union Hill, N. J.

TELEGRAPHY taught by expert. The Paine Business School, 1931 Broadway, N. Y.

CANADA—LEARN PRACTICAL BUSINESS—Netting me $8 daily for years; by mail. A. C. Smith, Lock Box 572 C, Windsor, Ont., Canada.

FOR SALE—Brewery; a great bargain. Moody, Keokuk, Ia.

FOR SALE—Good Barber Shop; established ten years. 365 Ogden Ave., Chicago, Ill.

WANTED—8-foot Robinson or Keene cornice brake. Geo. E. Roesch, Aurora, Ill.

HELP WANTED.

ENGLAND — Electrical Draughtsman for telephone instrument work. Electric & Ordnance Accessories Co., Aston, Birmingham, Eng.

PHILIPPINE ISLANDS—Man who thoroughly understands running woodworking machinery, to go to Manila, P. I. Room 812, 135 Adams St., Chicago, Ill.

CANADA—Traveling Salesmen to sell coal-tar chemicals and rubber goods. A. C. Smith, L. Box 572, Windsor, Ont., Can.

WIRE WORKER—Ornamental iron and railing worker. Denver Iron and Wire Works Co., Denver, Colo.

BOYS are making $15 weekly soliciting subscriptions for Popular Mechanics, 604 Journal Building, Chicago, Ill.

WANTED—Machine and Drill Hands. S., 150, Chicago Heights, Ill.

WANTED—Machinists. Six good Bench Hand Machinists. 1720 Old Colony Bldg., Chicago, Ill.

WANTED—Marker. Chicago Bridge & Iron Co., Washington Heights, Ill.

WANTED—Draftsman; map work; $12. Sasse & Dinwiddie, Crown Point, Ind.

Attractions for Next Week.

Not an atom of beneficial knowledge was ever obtained from reading about murders, suicides, divorces, and such tragedies and social scandals. "How to do things" and "How things are done" is the kind of knowledge you need in this day when men and nations are striving for commercial supremacy. Another thing:

This old world hasn't time to stop that it may learn your name.
It doesn't care a rap about your blue blood or your fame.
The only thing this old world cares about concerning you,
Is simply this one thing to wit, "Well sir; What can you do?"

So don't waste time in hunting up a useless pedigree:
And don't bewail the fact that you are not an LL. D.
But when the old world stops to ask: Well sir, what can you do?
Just roll your sleeves up elbow high, and say, "Well, I'll show you."

The above taken from a recent issue of Popular Mechanics explains it exactly. That is the twentieth century idea.

Next week Popular Mechanics will contain an interesting chapter on "How to Make a Small Electric Motor." It will also tell of an amusing sport, "How to catch fish with a jug." Then there will be accounts of late inventions, etc., that may give you an idea of how to invent things yourself.

There are two kinds of women—one that the woman admires and one that the man admires. Popular Mechanics will tell you about the latter next week.—The Mormons are spreading out and are going to build a big temple in Denmark just like the one in Salt Lake City.—Wanamaker turned bricks when he was five years old for 2 cents a day.—There will be dozens of other articles just as interesting in Popular Mechanics next week. It is the Twentieth Century paper.

WANTED—Copper Plate Printers. M. M. Bear Co., 57 Washington St., Chicago, Ill.

METAL PATTERN MAKERS—Gale Mfg. Co., Albion, Mich.

WATCH CASE REPAIRER—Meyer Jewelry Co., 1016 Main St., Kansas City, Mo.

TEMPLETMAKER—Chicago Bridge & Iron Co., Washington Heights, Ill.

MEXICO—Salesmen to sell Mexican drawn work in the States. Charles Mandeh, Jr., Monterey, Mex.

LINE ETCHER—H. W. Weisbrodt, Cincinnati, O.

BULLDOZER MACHINE OPERATOR—Simons Mfg. Co., Kenosha, Wis.

MARBLE CUTTERS—Pickle Co., 1901 Broadway, St. Louis, Mo.

WANTED—Agents and salesmen; salary and expenses to hustlers; answer at once. Southern Contracting Co., Lake City, Fla.

POSITIONS WANTED.

WANTED—By young man with good technical education position in mechanical engineering work. Excellent draughtsman. References. Address 405 Popular Mechanics.

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CUBA—I want a general representation in Havana for machinery, tools and hardware specialties. C. S. Lawrence, Box 814 New Orleans, La.

WANTED—Position at seashore to repair and tend boats. Box 3, Madbury, N. H.

ELECTRICIAN 24 years old; technical education. Box 99, Union, Ia.

TINNER, 16 years' experience. P. O. Box 626, Lexington, Ky.

PLUMBER, STEAM and HOT WATER FITTER. Chas. A. Clark, 6 Dean St., Adams, Mass.

YOUNG MAN of 21 wishes to complete plumber's trade. E. S. Miller, Genesee, Wis.

DIE AND TOOL MAKER, first class, on small, accurate work. Germany, 319 Cleveland St., East New York.

PATTERN-MAKER. A1. Geo. Gardner, 687 Montgomery St., Jersey City, N. J.

SITUATION WANTED—By Ice Machine Engineer; no brewery. Mathew Rocovich, 465 S. Paulina St., Chicago, Ill.

YOUNG MAN of 25 wants position where he can learn electrical engineering. Has knowledge of higher mathematics and general drawing. J. Martz, 185 East Superior St., Chicago.

SITUATION WANTED—As Demonstrator, by lady; best references. 643 Harrison St., Chicago, Ill.

HARNESSMAKER—Good, single preferred, for all-around work; at once. H. Becker & Son, Polo, Ill.